Remarks/Arguments

This is responsive to the Office Action dated May 9, 2006. Reconsideration of this application is respectfully requested.

Claims 1-25 are in the case.

Claim Rejections 35 U.S.C. Section 103

The Office Action indicates that it is responsive to a communication filed on November 11, 2005. However, it appears that the Office Action is actually responsive to an amendment filed on March 10, 2006, which amendment was not initially entered for the reasons noted in the Examiner's Advisory Action of March 30, 2006. These amendments were presumably entered as a result of the request for continued examination of April 11, 2006. It appears that the Applicant and the Examiner agree on the actual claims being examined; however, out of an abundance of caution, please advise if the claims being considered by the Examiner are not those initially filed on March 10, 2006.

In the Office Action, the Examiner rejected claims 1-5, 7, 15 and 17-21 as being obvious in view of the combined teaching of Freeman et al. (U.S. 6,519,539) and Werth et al. (U.S. 4,931,947). These rejections are respectfully traversed for the reasons given below. Before outlining this argument in detail, different aspects of embodiments of the present invention, as well as the cited art, are summarized.

Background and Summary

The present invention relates generally to a system and method for measuring internal resistance of an electrochemical device. More particularly, it relates to a system and method for measuring the internal resistance of individual fuel cells within a fuel cell stack, the fuel cell stack operating under dynamic flow conditions as

well as under varying load conditions, either during testing of the stack or during stand-alone power generation in a real world application.

Claim 1 recites an electrochemical system comprising a measuring device including a plurality of inputs connected across the plurality of cells to generate voltage and current signals indicative of voltage and current characteristics of the plurality of cells, and a current supply/draw means for superimposing modulated current values through the plurality of cells. This current supply/draw means is connected to the plurality of cells in parallel with a load to test the fuel cell stack during actual operation.

Freeman et al. disclose a measuring device including a plurality of inputs attached in series with the plurality of individual cells within a fuel cell stack. As noted by the Examiner, Freeman et al. do not disclose a load powered by the plurality of cells, the load being connected to the plurality of cells in parallel with a current supply/draw means.

Werth et al. disclose a hybrid power system incorporating both the fuel cell stack and batteries, which is used to meet the fluctuating demands of an external load. That is, during operation the batteries alternate between storing excess power during periods of low power demand, and providing supplemental power, during periods of high demand. In the system disclosed by Werth et al., the fuel cell stack is connected in parallel with an additional power source, the batteries, to provide the hybrid system.

Detailed Reply to Claim Rejections

In rejecting claims 1-5, 7, 15 and 17-21, the Examiner states that it would have been obvious to combine a method of connecting a load in parallel with a fuel cell as taught by Werth et al. in combination with measurement apparatus disclosed by Freeman et al. to provide the claimed invention. This position is respectfully traversed for a number of reasons.

First, it is respectfully submitted that the teachings of Werth et al. are directed to an entirely different problem than that of the present invention, or indeed than that of Freeman et al. Specifically, Freeman et al. is concerned with monitoring the performance of a fuel cell stack. In contrast, Werth et al. is concerned with buffering a fuel cell stack against increases or decreases in demand by providing an additional power source as described. The applicant can find no motivation, whether in the teachings of Freeman et al., or Werth et al., or other explanation for why a skilled person would look to Werth et al., which deals with supplementing the power supply provided by the fuel cell, to modify Freeman et al., which is concerned with monitoring the performance of a fuel cell stack.

Secondly, it is respectfully submitted that even if a person of skill in the art were to look to Werth et al. when considering how to modify Freeman et al., it would not be apparent to such skilled person how to modify Freeman et al. in view of the teachings of Werth et al. to provide the claimed invention. Specifically, claim 1 of the present application specifies that the load is connected to the plurality of cells in parallel with the current supply/draw means. This enables the plurality of cells to be tested during actual operation. In contrast, Werth et al. does not disclose any components connected in parallel with the load. This is not surprising as Werth et al. is not concerned with monitoring the performance of the plurality of fuel cells in the same manner as that of the present invention. Instead, Werth et al. discloses connecting the plurality of cells in parallel with an alternative power source, namely batteries. Connecting the batteries, or any other element to the load in parallel with the plurality of fuel cells does not provide the claimed invention, nor does it appear to relate in any way to measuring or determining the performance of the fuel cells.

In any event, even if the teachings of Freeman et al. and Werth et al. are combined in the manner suggested by the Examiner, there are further differences between the invention as claimed and these combined teachings. Specifically, as recited in claims 4, 8, 18 and 22, the plurality of inputs of the measuring device are

connected across individual cells in the plurality of cells to obtain measurements reflecting the operating condition of the individual cells.

The Examiner takes the position that Freeman et al. discloses this feature at column 5, lines 40-56. However, it is not apparent to the applicant where in this portion of Freeman et al. the concept of providing the plurality of inputs of the measuring device across the individual cells in the plurality of cells is disclosed. If the Examiner renews this objection, then the Examiner is respectfully requested to provide more detailed comments about where exactly this feature is disclosed.

For analogous reasons, it is respectfully submitted that claim 17, as amended, clears the cited art. Specifically, neither Freeman et al. nor Werth et al. disclose drawing two parallel currents from a plurality of cells: one to generate voltage and current signals indicative of voltage and current characteristics of the plurality of cells; the other to drive a load. Werth et al. discloses providing a fuel cell stack and an alternative power source connected in parallel to a load; however, no component in parallel with the load is disclosed. Further, as discussed above, it is not apparent to the applicant what motivation, if any, exists to combine the teachings of Freeman et al. and Werth et al. If the Examiner elects to maintain the position that it would be obvious to combine the teachings of Freeman et al. and Werth et al., then the Examiner is respectfully requested to identify for the applicant where the motivation for combining these teachings can be found.

In view of the foregoing, it is respectfully submitted that claims 1 and 17, as well as all of the other claims, which ultimately depend from these claims, clear the cited art.

Favourable reconsideration and allowance of the application is respectfully requested. If there are any questions regarding the response, the Examiner is respectfully requested to contact Ian C. McMillan at the number indicated below.

Respectfully submitted,

Ravi B. Gopal

Ian C. McMillan
Registration No. 43,390
/sb
Encl.

Bereskin & Parr
Box 401
40 King Street West
Toronto, Ontario
Canada M5H 3Y2
Telephone: (416) 957-1644
Fax: (416) 361-1398